

ABSTRACT

There is provided a piezoelectric ceramic having a wider operating temperature range, being capable of obtaining a larger amount of displacement, being easily sintered, and being superior in terms of low emission, environment and ecology. A piezoelectric substrate (1) includes $(1-m-n)\{(\text{Na}_{1-x-y}\text{K}_x\text{Li}_y)(\text{Nb}_{1-z}\text{Ta}_z)\text{O}_3\} + m\{(\text{M1})\text{ZrO}_3\} + n\{\text{M2}(\text{Nb}_{1-w}\text{Ta}_w)_2\text{O}_6\}$ as a main component. M1 and M2 each represent an alkaline-earth metal element, and the values of x, y, m and n are preferably within a range of $0.1 \leq x \leq 0.9$, $0 \leq y \leq 0.1$, $0 < m < 0.1$ and $0 < n \leq 0.01$, respectively. Thereby, a higher Curie temperature and a larger amount of displacement can be obtained, and sintering can be more easily performed. At the time of sintering, after (M1) ZrO_3 is formed, other materials are mixed.